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ON THE GENUS SYRINGOPLEURA SCHUCHERT[1]

GEORGE H. GIRTY

The genus Syringopleura has recently been proposed[2] for a brachiopod of the Spirifer group. It is typified by *Syringothyris randalli*, a species which Simpson described as possessing the internal structure of Syringothyris, along with a plicated fold and sinus. As is well known, Syringothyris is a Spirifer having a high area, a simple fold and sinus, and the characteristic "twilled cloth" sculpture. Internally there is developed a delthyrial plate, not to be confounded with the deltidial plates, which bears on the inner side the split tube characteristic of the genus. Typical Syringothyris is generally regarded as being an offshoot of the ostiolate Spirifers. Professor Schuchert gives the following reasons for establishing the genus:

> Another phylum originated in the Atlantic realm of the Appalachian province in *Spirifer randalli*, which also has a well-developed syrinx, but differs from *Syringothyris* of the Mississippian sea in having a strongly plicated fold and sinus. This stock must be separated generically from those of the Mississippian sea because of its different phyletic derivation, and for it is proposed the generic name *Syringopleura* (from *syrinx* and *pleura* or rib, having reference to the plicated fold and sinus), with *S. randalli* Simpson as the genotype.

Now I am compelled to question the validity of the genus Syringopleura on all the points advanced by Professor Schuchert.

In the first place, it seems highly probable that *S. randalli* does not possess the external peculiarity on which the genus was chiefly founded—the plicated fold and sinus. Syringothyroid shells are extremely abundant at the locality and horizon at which *S. randalli* was found, and I have examined a large number of specimens without in a single instance finding any which possessed the characteristic mesial plications. It is possible, of course, that the specimens coming before me all belonged to an abundant species, while *S. randalli* represents a different and much rarer one. The probabilities appear to me decidedly adverse to this hypothesis, however, and the following statement of Professor Schuchert's is in point. He writes of Syringothyris: "At no time, however, was there more than one species in a fauna, and all these are very much alike."

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[1] Published by permission of the Director of the U.S. Geological Survey.

[2] *Am. Jour. Sci.*, XXX (1910), 224.

Thanks to the courtesy of the Academy of Natural Sciences of Philadelphia, I have been able to examine the type specimens of *S. randalli*, and this examination seems to bear out the opinion expressed above. The specimens sent me as the types are three in number (Nos. 9532, 9533, and 9534), only one of which, however, was figured in connection with Simpson's description.[1] It is an internal mold of a ventral valve. It is a fact that this specimen shows some very obscure, longitudinal markings at the bottom of the sinus, but it is also a fact that Simpson's drawing exaggerates these unpardonably.

When fossils are preserved as molds, the best opportunity to observe external characters is naturally afforded by molds of the outside. In the case of such species as *S. randalli*, internal molds of the dorsal valve are more satisfactory than internal molds of the ventral valve, because testaceous deposits on the inner surface of the shell which tend to obscure such external features as the plications were there less extensively developed. In internal molds of either valve the marginal portions afford better evidence than those near the umbo, because the secondary deposits were chiefly formed over the older parts of the shell. On the internal ventral mold which is the type specimen of *S. randalli*, the lateral costae are well shown except in the cardinal and umbonal areas. In this degree of expression they stop abruptly at the sinus. The anterior part of the sinus, where the costae, if present, would naturally be most conspicuously developed, is nearly, if not quite, smooth. The posterior part is occupied by the large umbonal scars. It is in the intermediate portion, where the test was probably still appreciably thickened, though less so than at the umbo, which was filled by the apical callosity, that the obscure radial markings can best be seen. It is doubtful, however, whether these can be attributed to normal costation, which ought to be still better exhibited toward the front, rather than to inequalities in the rapidly thinning apical callosity, such as would be shown on the inside but not on the outside of the shell. Similar markings have been observed on other species of Syringothyris.

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[1] *Am. Phil. Soc., Trans.*, XV, 441, Figs. 1, 2.

S. randalli occurs at the locality and horizon of the classic association of Syringothyris with *Spirifer disjunctus*.[1] *S. disjunctus*, or a species closely allied to it, occurs in equal abundance with the Syringothyris. Superficially the two types are distinguished by the fact that one has a simple fold and sinus and the other is plicated. Where this character is obscured, internal molds of ventral valves might be confused on casual observation, although one type possesses the syrinx and the other does not, and from the evidence in hand it seems almost certain that Simpson did thus confuse them, since one of the three type specimens of *Syringothyris randalli*, all of which are internal molds of ventral valves, is clearly a Spirifer. Although it does not show any surface characters whatever, it has the internal characters of and almost certainly belongs to the form commonly referred to *Spirifer disjunctus* in the Warren area. It appears plausible, therefore, that Simpson confused these two forms, and seeing well-marked plications on the fold and sinus of some specimens (*S. disjunctus*) felt justified in putting them into his description and into his figure, although they are only faintly suggested in the specimen from which the latter was drawn. Conclusive evidence can come only through an examination of the external mold of the type specimen, which is, of course, impossible; or less adequately through the discovery of other specimens unmistakably possessing the characters which *S. randalli* is said to have. But, for my own part, I am fairly satisfied that *S. randalli* is conspecific with the abundant associated Syringothyris which clearly has a simple fold and sinus.

Granting, however, that *S. randalli* does possess the plicated fold and sinus ascribed to it, let us examine into the argument by which this character is thought to justify the erection of a new genus.

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[1] At Warren, Pa., at a horizon not far below the "Sub-Olean conglomerate" in a series of strata which I at one time proposed to call the Bradfordian group.

Professor Schuchert says that the erection of a genus is demanded by the fact that S. *randalli* has a different phyletic derivation from typical Syringothyris.[1] He is unfortunately not very explicit but he apparently derives typical Syringothyris from the ostiolate Spirifers and S. *randalli* (Syringopleura) from the aperturati. But it is a fair hypothesis that S. *randalli*, the hypothetized *randalli*, may have come from typical Syringothyris by the introduction of mesial plications at so early a period that in the imperfect condition of our record the two types seem to have developed nearly simultaneously. Or, a second hypothesis is not negligible, that the two may have sprung from some common ancestor, at present unknown, which was intermediate between the ostiolate Spirifers on the one hand (or whatever stock gave rise to Syringothyris) and Syringothyris and "Syringopleura" on the other. Professor Schuchert offers no evidence to support his theory of the derivation of S. *randalli* as against these two other possible hypotheses.[2]

But even if we grant that there is a species with the characters of S. *randalli* and that it is derived from some other group of Spirifers than that which gave rise to typical Syringothyris, a scrutiny into the line of reasoning which justifies the erection of a new genus from these premises will not, I believe, be without profit. The argument seems to be that, because S. *randalli* and typical Syringothyris belong to different phyla, therefore it is necessary to place them in different genera.

Originally and strictly the word phylum in biology is used for one of the larger divisions of the animal or vegetable kingdom, but it seems to be often employed for small groups standing in a line of genetic relationship. Thus *phylum* has a variety of meanings as regards comprehensiveness. We might even say that two Spirifers belonging to the same species but having different lines of descent for numerous generations belong to different phyla;

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[1] Professor Schuchert is perhaps a little misleading in his expression which seems to limit Syringothyris to what he calls the Mississippian sea. Characteristic Syringothyris, of course, occurs not only associated with "S. *randalli*" near Warren, but at other localities and horizons in the same province.

[2] Still other hypotheses are possible, equally plausible with these. For instance, Hall and Clarke name a number of ostiolate Spirifers with incipient plications on the fold and sinus.

or we might say, as Professor Schuchert does, that two species representing different sections of the genus Spirifer belong to different phyla, and so on. Or, on the other hand, we might say that two genera, such as Spirifer and Athyris, belong to different pyhla, the one to the Spiriferoid stock, the other to the Athyroid. The meaning of the word depends largely on the viewpoint of the occasion, and any conclusion based on phyletic relationship is almost nil unless the writer defines what he means by phylum.

But let us consider what the force of such an argument really is in general terms. Put case that there are two Spirifers having other characters identical but differing in the height of the area or the length of the cardinal line or other similar characters and belonging to different phyla in the narrowest sense. We do not distinguish them as different genera or even different species, but say that these differences concern minor characters in which experience has shown that individual specimens differ from one another and vary at different stages of their growth. Put case again that we have two Spirifers, one with simple fold and sinus and pustulose sculpture, the other with plicated fold and sinus and finely reticulate sculpture, the two belonging to different phyla, in a broader sense. Here, again, we do not say, as Professor Schuchert does, that these species belong to different genera because they present important differences and have different phyletic relations, for the characters which they possess in common are such as we recognize as characteristic of the genus Spirifer and the differences are such as experience has shown to be useful only in specific discrimination. Again, suppose we have two generally similar oval brachiopods, one with internal spires, the other with an internal loop, and belonging to different phyla, in a still broader sense. We do not refer these types to different genera because they show such and such differences and belong to different phyla, for the differences are more important than those by which genera are determined and we place the species in still more widely separated groups. In other words, in such cases as these phyletic relationship enters little, if at all, into the determination of taxonomy. We go straight to the intrinsic characters of the form and according to the nature and degree of its resemblances and differences determine the order of its taxonomic relationship to other organisms.

On the other hand, let us suppose a rare case in which two forms are closely alike in most, or even all, of their mature characters but at the same time they can be shown to belong to different phyla. In this instance phyletic relationship has pre-eminent importance. We cannot place the two types in taxonomic relationship more close than the most remotely related of their ancestors. They must be placed in different genera (at least) if that phyletic relationship is generic; in different families if it is familiar; in different orders if it is ordinal, and so on. The logic of the situation seems, then, really to be that the phyletic argument only sets a limit on how close two types may stand in taxonomy, but does not enter into the determination of how far apart they may stand. That is based upon the physical characters of the mature individuals, not upon development or on the theories of investigators.

Returning now to the case of Syringothyris and Syringopleura, we find that the reputed ancestor of Syringothyris and the reputed ancestor of the suppositious Syringopleura are different species of the genus Spirifer. The phyletic argument,[1] if used aright, proves not that they must belong to different genera, but that they cannot be placed in the same species. If we base a determination of the relationship of Syringothyris and "Syringopleura" on their real, as distinguished from their speculative, characters, it would appear that they should be regarded as specifically, but not generically, distinct. At least, the peculiarities which are thought to distinguish Syringopleura are only rated as of specific import in the true Spirifers, and I do not see why they should be more important in the closely related syringophorous shells.

Therefore, it appears to me that Syringopleura is based on a false premise, on an unsupported assumption, and on loose reasoning, and that it cannot stand.

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[1] The phyletic (phylic would be a much better term, but it unfortunately lacks authority) argument, which really only serves as a check upon misleading or misunderstood direct evidence, to prevent two forms from being classed in too close zoölogical categories, can rarely be used in paleontologic work because the phyletic relationship is seldom, if ever, more than speculative. Even if the trend of the evidence were correctly presented by him, the example set by Professor Schuchert in his proposed genus Syringopleura is fraught with danger, since it would make our zoölogic classification the prey of all sorts of theories, however ill-considered.

If, as remarked by Professor Schuchert, several different types of Spirifer exhibit a tendency to develop the split tube, and if the development of this structure may be looked for in almost any high areaed member of the genus, far from adopting the course which he advocates of establishing a new genus for every such manifestation, I should feel that this series of facts materially lessened, if it did not destroy, the value of the syrinx as a generic character.

The function of the syrinx is not definitely known. The most probable explanation of its function, and the one adopted by Professor Schuchert, is that it is connected with the pedicle muscle. Even in typical Syringothyris there is no cogent reason for inferring that the soft parts possessed any structures different from those of Spirifer. If so, this typical structure of Syringothyris is probably to be regarded only as a result of excessive shell secretion, and it may well be questioned whether its employment as a generic character is any more justifiable than it would be so to employ the deposit of an apical callosity, with which the syrinx is perhaps a concurrent manifestation, or of a thick test with attendant deep muscular imprintation, a character regarded of little importance in other types of brachiopods. The tendency to develop an incipient syrinx in various groups of Spirifer contributes not a little to justify such a low estimate of the taxonomic value of this character.